produces a bore having a predictable dimension for receiving said dental implant; and

a driving mechanism providing vibrational movement to said tool.

140. (New) The dental instrument of claim 139, wherein said driving mechanism includes a piezoelectric device.

141. (New) The dental instrument of claim 139, wherein said bone engaging surface has a gradually expanding region behind said lower end.

142. (New) The dental instrument of claim 139, wherein said tool is configured to maintain a substantial portion of bone acted upon by said tool within said bore.--

REMARKS

Claims 90-142 remain in the application for prosecution. Claims 131-142 have been added. The Applicant believes the new claims are allowable over the prior art of record. Submitted herewith is a clean set of pending claims.

In view of the above amendments and remarks, the Applicant respectfully submits that the claims now presented in this application are in condition for allowance.

If there are any matters which may be resolved or clarified through a telephone interview, the Examiner is respectfully requested to contact the Applicant's undersigned attorney at the number indicated.

Respectfully submitted,

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Clean Set Of Pending Claims
U.S. Patent Application No. 09/634,082

90. A device for developing a bore in living bone, said device comprising:

an osteotome tool having a central axis and a surface for compacting bone;

a driving mechanism including means for interchangeably coupling said driving mechanism to said osteotome tool, said driving mechanism including a piezoelectric transducer element imparting a vibrational motion to said osteotome tool; and

a power source for delivering electrical power to said driving mechanism.

91. The device of claim 90, wherein said coupling means includes means for quickly releasing and attaching said tool from said driving mechanism.

92. The device of claim 90, wherein said vibrational motion is primarily in the direction of said central axis of said osteotome tool.

93. The device of claim 90, wherein said driving mechanism includes a drive rod between said piezoelectric transducer and said coupling means.

94. The device of claim 90, wherein said driving mechanism includes a cone-shaped mechanical coupling component.

95. The device of claim 90, wherein said osteotome tool has at least one segment with a constant cross-section.

96. The device of claim 90, wherein said osteotome tool has a cross-section that increases from said lower end to said upper end.

97. The device of claim 90, wherein said coupling means is selected from the group consisting of a spring element, a pin element extending into said osteotome tool, a screw element extending into said osteotome tool, a ball-slot clamping mechanism, a ball-slide clamping mechanism, and a three jaw-chuck device.

98. A method for developing a bore in a living bone, said method comprising the steps of:

providing an osteotome tool having a central axis, a lower end, an upper end, and an engaging surface between said lower and upper ends;

providing a driving mechanism including a piezoelectric transducer element capable of producing vibrational motion;

coupling said driving mechanism to said osteotome tool; and

powering said driving mechanism to actuate said piezoelectric transducer element while engaging said living bone.

99. The method of claim 98, wherein said engaging surface has a sequence of regions from said lower end to said upper end that increase in cross-sectional area.

100. The method of claim 98, wherein said tool has regions of a constant diameter.

101. The method of claim 98, wherein said piezoelectric transducer element oscillates when electrical oscillations are produced by said electrical power.

102. The method of claim 98, wherein said vibrational motion occurs along said central axis of said osteotome tool.

103. The method of claim 98, wherein said vibrational motion has a low amplitude of less than about 1.0 mm.

104. The method of claim 98, wherein said vibrational motion has a frequency of about 500 Hz.

105. The method of claim 98, wherein said vibrational motion is varied by changes to a frequency and an amplitude of electric power supplied to said piezoelectric transducer.

106. A device for developing in living bone a bore that is defined by bone tissue with increased density, said device comprising:

a compaction tool having a central axis, a lower end, and upper end, and a bone engaging surface for displacing bone tissue that is initially in the area defined by said bore primarily in the radial direction with respect to said central axis; and

a driving mechanism including means for coupling said driving mechanism to said tool, said driving mechanism further including means for vibrationally moving said tool.

107. The device of claim 106, wherein said compaction tool is tapered from said upper end to said lower end.

108. The device of claim 106, wherein said vibrational movement is in a direction of said central axis.

109. The device of claim 106, wherein said osteotome tool has at least one segment with a constant cross-section.

110. A method for developing a bore in a living bone, said method comprising the steps of:

providing an osteotome tool having a central axis, a lower end, an upper end, and an engaging surface between said lower and upper ends;

providing a driving mechanism capable of producing reciprocating motion;

coupling said driving mechanism to said osteotome tool; and

engaging said osteotome tool with said living bone, while said osteotome tool is undergoing reciprocating motion.

111. The method of claim 110, wherein said reciprocating motion is in a direction of along said central axis.

112. The method of claim 110, wherein said osteotome tool simultaneously engages said living bone substantially along an entire length of said bore.

113. The method of claim 110, wherein said osteotome tool is tapered from said upper end to said lower end.

114. The method of claim 110, wherein said osteotome tool incrementally compacts said living bone while developing said bore.

115. The method of claim 110, further including the step of developing a pilot hole; and said step of engaging includes inserting said tool into said pilot hole.

116. A device for developing a bore in living bone, comprising:

a tool having a central axis, a lower end, and an upper end, said tool having a cutting edge at said lower end and a bone engaging surface above said cutting edge for displacing bone tissue primarily in the radial direction with respect to said central axis; and

a driving mechanism coupled to said tool and producing vibrational movement to said tool.

117. The device of claim 116, wherein said driving mechanism includes a piezoelectric device.

118. The device of claim 116, wherein said bone engaging surface has a gradually expanding region behind said cutting edge.

119. The device of claim 118, wherein said gradually expanding region is directly behind said cutting edge.

120. The device of claim 116, wherein said tool includes conduits for passing a lubricating fluid.

121. The device of claim 116, wherein said tool is configured to maintain a substantial portion of bone acted upon by said tool within said bore.

122. The device of claim 116, wherein said cutting edge is located in a generally circular configuration.

123. The device of claim 122, wherein said tool has a concave surface within said circular configuration.

124. A method for developing a bore in living bone, comprising:

engaging a tool with a piezoelectric component, said tool having a lower cutting edge and an expanding cross-sectional region above said lower cutting edge;

inserting said cutting edge into an opening of said bone;

cutting said bone with said cutting edge while simultaneously compacting said bone with said expanding cross-sectional region.

125. The method of claim 124, wherein said tool has regions of constant diameter.

126. The method of claim 124, wherein said piezoelectric component provides vibrational motion along a central axis of said tool.

127. The method of claim 126, wherein said vibrational motion has a frequency of about 500 Hz.

128. A method for developing a bore in a living bone, comprising:

providing a tool having a central axis, a cutting edge at a lowermost end, and an engaging surface above said cutting edge for compacting said living bone;

providing a driving mechanism capable of producing vibrational motion along said central axis;

coupling said driving mechanism to said tool; and

powering said driving mechanism while engaging said living bone with said cutting edge.

129. The method of claim 128, wherein said driving mechanism includes a piezoelectric device.

130. The method of claim 128, wherein said powering said driving mechanism includes applying electrical power to said piezoelectric device at a selective frequency and amplitude.

131. (New) A dental instrument for developing a bore in living bone that is to receive a dental implant, said device comprising:

an osteotome tool having a central axis, a generally circular cross-section and a surface for compacting bone in a radial direction with respect to said central axis, said tool being dimensioned to provide said bore with a dimension for receiving said dental implant;

a driving mechanism including means for interchangeably coupling said driving mechanism to said osteotome tool, said driving mechanism including a piezoelectric transducer element imparting a vibrational motion to said osteotome tool; and

a power source for delivering electrical power to said driving mechanism.

132. (New) The dental instrument of claim 131, wherein said osteotome tool gradually tapers outwardly.

133. (New) The dental instrument of claim 131, wherein said osteotome tool has a transverse dimension along its length that generally corresponds to a diameter of said dental implant.

134. (New) A method for installing a dental implant into a bore in a living bone, said method comprising the steps of:

providing an osteotome tool having a central axis, a generally circular cross-section, a lower end, an upper end, and an engaging surface between said lower and upper ends;

providing a driving mechanism including a piezoelectric transducer element capable of producing vibrational motion;

coupling said driving mechanism to said osteotome tool;

powering said driving mechanism to actuate said piezoelectric transducer element;

engaging said living bone with said osteotome tool to develop said bore, said bore having a generally circular cross-section; and

screwing said dental implant into said bore.

135. (New) The method of claim 134, wherein said engaging surface has a sequence of regions from said lower end to said upper end that increase in cross-sectional area.

136. (New) The method of claim 134, wherein said tool has regions of a constant diameter.

137. (New) A dental instrument for developing a bore that is defined by bone tissue with increased density, said device comprising:

a compaction tool having a central axis, a lower end, and upper end, and a bone engaging surface for displacing bone tissue that is initially in the area defined by said bore primarily in the radial direction with respect to said central axis, said compaction tool having a generally circular cross section for producing a known dimension in said bore for receiving a dental implant; and

a driving mechanism including means for coupling said driving mechanism to said tool, said driving mechanism further including means for vibrationally moving said tool while in said bore.

138. (New) The dental instrument vice of claim 137, wherein said compaction tool is tapered from said upper end to said lower end.

139. (New) A dental instrument for developing a bore in living bone for receiving a dental implant, comprising:

a tool having a central axis, a lower end, and an upper end, said tool having a bone engaging surface above said lower end for displacing bone tissue primarily in the radial direction with respect to said central axis, said tool having a generally circular cross-section with a transverse dimension that produces a bore having a predictable dimension for receiving said dental implant; and

a driving mechanism providing vibrational movement to said tool.

140. (New) The dental instrument of claim 139, wherein said driving mechanism includes a piezoelectric device.

141. (New) The dental instrument of claim 139, wherein said bone engaging surface has a gradually expanding region behind said lower end.

142. (New) The dental instrument of claim 139, wherein said tool is configured to maintain a substantial portion of bone acted upon by said tool within said bore.